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ORIGINAL CONTRIBUTION

Hans Zinsser: A Tale of Two Cultures

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Hans Zinsser, president of the Society of American Bacteriologists in 1926, was known as much for his literary and textbook writing as for his scientific contributions. He was a widely known scientist and person of letters. His early interests in poetry and other forms of literature were maintained and developed during his career as a microbiologist, and his most enduring legacy is based on his writing about microbiology for a general readership as well as his reflective and philosophical autobiography.

Hans Zinsser (1878-1940) was president of the Society of American Bacteriologists in 1926. At that time, he was 48 years old and Professor of Bacteriology and Immunology at Harvard Medical School (Figure 1). It is likely that Zinsser is one of the few early Society presidents whose name is still recognized by current students of microbiology. Such fame may result from some astounding discovery, such as Oswald Avery's work on transforming DNA; or because of eponymic immortality such as Rebecca Lancefield's immunological classifications; or because of authorship of enduring works of scholarship or pedagogy, such as the case for David Bergey and his *Manual of Determinative Bacteriology*. Hans Zinsser's memory lives on for this latter reason: he was a gifted writer of both textbooks and literary works. Today we marvel at individuals who bridge C.P. Snow's *Two Cultures*, but there have always been people, with erudition, learning and talent to spare, who have made their marks in both science and the arts: recall that science was Goethe's day-job; Alexandr Borodin was a famous clinical chemist; and Arthur Conan Doyle was a family physician. Perhaps even Steven J. Gould of our own time will be remembered for his graceful stories of living things long after his theory of punctuated equilibrium is on the dust heap of history, replaced by newer versions of the truth.

While Hans Zinsser is not the record-holder for authorship of the most durable textbook, his *Text Book of Bacteriology*, first published in 1911 with Philip Hanson Hiss, is still current in its 20th edition, published in 1992, under the editorship of a distinguished group of microbiologists [1]. His 1914 text *Infection and Resistance* went through five editions, the last one published in 1939 with coauthors John F.

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Figure 1. Hans Zinsser (1878-1940). Photograph courtesy of American Society of Microbiology.

Enders and LeRoy D. Fothergill [2]. Clearly, Zinsser had a gift for the written word.

Hans Zinsser represents an increasingly rare intellectual tradition, that of amateurism. Not amateur in the modern sense of bumbling incompetence, but amateur in its older etymological sense, that is for doing something for the pure love of it. He was a scientist without a Ph.D; he was a writer without having lived in Bloomsbury; and he was an educator and leader simply by his own nature.

In this brief review, I will consider Zinsser's work in what we (artificially, I think) divide into two domains of thought: science and literature. It is in the latter domain, I would suggest, that Zinsser made his lasting contributions.

Hans Zinsser was born in 1878 in New York city into a liberal German family with close ties to the socialists involved in the 1847 uprisings in Germany[b]. Indeed, Zinsser's father, an entrepreneurial industrial chemist, is buried next to Carl Schurz, one of the great German-American leaders of his time. Hans was raised in a home of intellectual culture and privilege, with summers in Europe, private tutors, and the time and tranquility to learn to ride well, to play the violin, and to become fluent in several languages. In due course, he attended Columbia University and concentrated his studies in the Comparative Literature department. He was particularly influenced by the professor in that department, George Woodberry, and a year after graduation, Zinsser and a close friend, William A.

[b] A general reference on Zinsser's life is found in *The Biographical Memoirs of the National Academy of Sciences* [3].

Bradley (1878-1939) published a small book of their poems and dedicated the volume to Woodberry [4].

How Hans came to science from such literary beginnings is described in his autobiography (although one must be suspicious of such memories of the elderly trying to make some logical sense of their youth, I suggest we accept this account with that caveat):

> In my sophomore year, while in the Woodberrian poetic exaltation, and feeling much of the time like a young Shelley, I threw a snowball across the campus at a professor emerging from the Natural Science Building. It was a prodigious shot, a good hundred yards, I think. I hit him in the ear, knocked his hat off, and had the time to disappear around the corner. I had nothing against him. It was an impulse, and a happy one, because I became guiltily conscious of him, thereafter, and eventually I took one of his courses as a sort of apologetic gesture . . . and it was he who awakened in me the realization of the philosophical implications of scientific fact. There were great teachers of science at Columbia in those days, and the junior year — largely owing to the inspiration of the man whom I had hit in the ear — found me, without cutting loose from the Department of Comparative Literature, feeling as though I had suddenly entered a new world of wonders and revelations, on the top floor of Schermerhorn Hall under the reign of Edmund B. Wilson, and Bashford Dean [5, pp. 47-48].

Such random events and contingencies, of course, are what determine the courses of our lives, contrary to the beliefs of many of my always anxious and overprogrammed young friends.

The practical necessity of a career which provided a livelihood appeared to be the main consideration that led Zinsser to enter medical school at Columbia in 1899. Opportunities for a paying job as a scientist were uncertain at best, but medicine might allow him to follow his interests in science while still earning a living. While in medical school he completed a thesis for the M.A. degree on the early embryology of the mouse, and he also did extra work in bacteriology. His first scientific publication, it seems, was in 1903, the year of his graduation from medical school, and was on the effect of radium emanations on bacteria. He obtained a position as house physician at Roosevelt Hospital in New York City, and after two years there, he joined a classmate in a small private practice of general medicine in New York. Again, in his own words (in the third person):

> . . . finding that there was no competitive demand for his talents in any of the medical laboratories, [he] established himself, for a time, as a practitioner in New York. He was not a success, though the experience did a great deal to develop his judgement. Yet his heart was never in practice. From the very beginning, he retained a place for work in the laboratories of the College of Physicians and Surgeons, where he was usually to be found when some patient asked for him. When he was telephoned for and conscientiously rushed to his office, he was so obviously annoyed by the interruption that few tried him more than once. That sort of thing doesn't help" [5, p. 154].

Fortunately for Zinsser, for he reported income of $1,100, against expenses of $6,000 that year, he was offered a full-time job at Columbia in 1908 as Instructor in Bacteriology. This was a busy period: he published the first edition of the *Text Book of Bacteriology* with Philip Hanson Hiss, Jr., with whom he also worked on the role of "leukocytic extracts" on infections. Zinsser's reputation was growing so that in 1910 he was offered, and accepted, the Headship of the Department of Bacteriology at Stanford University. He went to Stanford with some trepidation, however, because of the admonition of Jacques Loeb, the famous biologist from the Rockefeller Institute, against the flamboyant president of Stanford, David Starr Jordan. Loeb counseled Zinsser:

> A man of your temperament will stand it about six months. Then you will come to me

> to help you get another job. But if you wish to be a success at Stanford, work on fish. Jordan himself, when he works at all, works on fish. He counts the scales on their behinds. [everyone] works on fish. The geologists, the palaeontologists, the botanists, the English Department, the Romance Languages Department, even the philosophers — they all work on fish. Go there my boy, be happy, and work on fish — or, at least, if you are too honest for straight fish, work on the bacteria you can find in fish. But if you love your family, don't get very far away from fish" [5, p. 192].

Zinsser, however, found Jordan and Stanford much to his liking, and established a fruitful connection with Stewart Young, a physical chemist who contributed the chapter on colloids to the text on *Infection and Resistance* that Zinsser wrote during his time in Palo Alto.

But the opportunity to return to his Alma Mater proved decisive, and in 1913 he returned to Columbia as Professor of Bacteriology and Immunology, where he remained for 10 more years. Not only was this period one of worldwide upheaval, but it was a period of professional and personal maturation for Zinsser. He participated in a Red Cross Typhus Commission to Serbia and served in the Army Medical Corp in important positions in public and military sanitation in Europe during World War I. In 1923, he went to Russia, again on a Red Cross Sanitation Commission, and then in 1923 he moved to Harvard Medical School as Chair of Bacteriology and Immunology

It is interesting that few of the biographical memoirs emphasize what we would call "his science." Several themes recurred in his laboratory research: the nature of serological reactions; vaccination against syphilis; and vaccination against typhus. From his study of serological reactions and the role of modifications of antigens by heat and acid, he identified for the first time what he called "residue antigens," and he emphasized the essential role of these proteose-like substances in immunological reactions.

Through the work of Michael Heidelberger and Oswald Avery, we now know these residue antigens as polysaccharides. His work on syphilis was not directly successful in his effort "to take the danger out of love" [6], and he was only partly successful in paving the way to a successful typhus vaccine.

Let me now turn to some of Zinsser's non-scientific writings . . . works that are still in print over a half century after they were first published. As mentioned above, he entered college as an aspiring literary scholar, hoping for a career as a writer. We have a sampling of his early work because he and his friend Bradley published a book of 42 poems, 15 by Zinsser, in 1901. This book was a private edition of 100 copies and bears the title *Amicitia Amorque* [4]. Two stanzas give the flavor of young Zinsser's efforts at his most Shelley-esque:

> The cold little wrens on a wintry tree
> Sadly sings of the never-to-be
> And the dead leaves, driven by,
> Rustle and whisper "Thou and I."

And:

> The flowers all were open,
> Kissed by the rays of May;
> "My robin-love," the sparrow sang,
> "My love flies home today."

These are quite representative, and they suggest an interest in ornithology much more that in microbes. This little book is not listed in Zinsser's "complete" bibliography in his National Academy of Sciences obituary; perhaps the omission was deliberate! Clearly, at this point, medicine seemed like a wise choice.

Yet one usually survives youthful romanticism, and as Zinsser noted, perhaps the experience of medical practice, the horrors of World War I, and his success as a textbook author, provided him with judgement, maturity and perspective. By

1928, at age 50, Zinsser again felt confident enough to publish more of his poems. But this time he did so under a pseudonym. From 1928 to 1940, the year of his death, he regularly published poems in the *Atlantic Monthly* under the initials "R.S." These poems were republished collectively in 1942 [7]. The meaning or allusion of "R.S." has been the subject of much speculation but no definitive solution. John Enders, who was Zinsser's friend and close colleague at Harvard, has been quoted as saying that "R.S." refers to Rudolph Schmidt, the author of a work on pain which Zinsser translated from German in 1911. However, in Enders own papers and recollections he only acknowledges the enigma. Other authors have offered speculations such as "real self," "romantic scientist," etc.

These poems, many in sonnet form, are restrained, sometimes sad, and express a wistfulness at the constraints of duty and maturity. Deep inside, it seems the famous scientist still would like to lob a snowball across the campus at a far-off professor, or rhapsodize about robins in May.

But it is not his poems by which we remember Zinsser today. It is, of course his two popular books, one on the role of epidemics in history: *Rats, Lice and History* [8], and the other, his classic of medical biography, *As I Remember Him: The Biography of R.S.* [5].

It is through *Rats, Lice and History* that Zinsser's somewhat unbalanced reputation for work on typhus mainly rests. This book, however, is not about any of Zinsser's scientific studies; instead typhus serves as a framework for his reflections on whatever seems to have come to his mind. *Tristram Shandy* was one of Zinsser's favorite books, and *Rats Lice and History* is certainly in the tradition of the Grand Shaggy Dog Story. He gives it away, of course in the subtitle: "*Being a Study in Biography, Which, after Twelve Preliminary Chapters Indispensable for the Preparation of the Lay Reader, Deals with the Life History of TYPHUS FEVER.*" I will not, and indeed probably could not, summarize these "indispensable" preliminary chapters, but will only note that they are filled with dialogs between Zinsser, the scientist, and Zinsser, the man of letters, with digs at literary pretentiousness, with pedantic footnotes, and with untranslated quotations in various languages.

While this book is certainly written in a playful way, it has a serious purpose, one that has been imitated often, but perhaps never quite equaled. Zinsser wants to make a serious case for the importance of disease, especially epidemic infectious disease as one of the great contingencies in the history of the world. His virtuoso performance exhibits his wide classical learning, and what must have been an impressive memory for facts, texts and epigrams. He traces and recounts many episodes in the history of Western Civilization that directly or indirectly were the result of the specifics of one epidemic or another. This is, of course, the same theme elaborated by William McNeill in his famous and enormously influential book, *Plagues and Peoples*, written in the early 1970s [9]. While *Rats, Lice and History* is not decorated with scholarly citations, references to the primary sources, or an exhaustive bibliography, it is profoundly thought provoking, and in many ways exhibits a prescience of things that were to come in Europe at the end of the 1930s. This book is still in print and continues to be read by generations who sense its antiquarian qualities, who may be puzzled by the acerbic references to the literary dandies of the interwar period, but who, nonetheless, are fascinated by the breath-taking brio of Zinsser's style and by the basic appeal of his central thesis.

In 1938, Zinsser traveled to China to work at Peking Union Medical College for awhile with his former student Sam Zia. Together they studied typhus in China and

worked on ways to prepare sufficient amounts of the rickettsia in order to prepare a vaccine. On the sea voyage back to America, Zinsser realized he was ill, and surmised the diagnosis, leukemia, which was confirmed when he arrived back in Boston. Since he started to write his autobiography at this point, it seems reasonable to suggest that this illness, which he knew would be terminal, impelled him to write a story of his life, perhaps sooner than he had envisioned. Again, as with *Rats Lice and History*, Zinsser took a rather unconventional literary approach and put his autobiography in the third person. This device allowed him certain authorial license, and gives the work an air of objectivity and restraint, always hallmarks of his writing. Once again, he employed his alter ego, "R.S.," as his subject. This book, entitled *As I Remember Him*, was serialized in 1939 in the *Atlantic Monthly* and appeared in book form in May 1940, just a few months before his death.

This autobiography, which has been recognized as a classic in both medical biography and in reflective writing on one's own impending death, allowed Zinsser to range over many topics of his broad interests. The reviewer for the *New York Herald Tribune*, Lewis Gannett, called the book "racy, witty and profound" [on dust jacket of Ref. 5]. Zinsser, at times, makes fun of himself, and, at times, of others, especially in a chapter entitled "Thoughts on the New Humanism, with Preliminary Remarks on University Presidents." He describes in tender and thoughtful detail some of the great colleagues he has known, such icons as Abraham Jacobi, his personal pediatrician and teacher, and Charles Nicolle, his colleague in typhus work. Most affecting, however, is Zinsser's account of his own illness and incipient demise. The final chapter is subtitled: "In Which Death is Met Adagio and Allegro Instead of, as Often, Maestoso or Largo Sostenuto." He describes his realization of his illness with humor as well as clinical exactitude:

> R.S. returned from his last professional journey badly damaged. On the steamer he was humiliated by the fact that not only occasional youngsters but even a British general of approximately his own age could outlast him at deck tennis. Also the sun, instead of tingeing his skin a healthy brown, turned him the lemon yellow of the sunburned anemic. He made a tentative diagnosis on himself before arrival in port.

He told of his meeting with an old friend who was his physician and who confirmed the diagnosis of lymphocytic leukemia. He went on, very effectively detached in the third person:

> But in those few minutes, R.S. told me, something took place in his mind that he regarded as sort of compensatory adjustment to the thought that he would soon be dead. In the prospect of death, life seemed to be given new meaning and fresh poignancy" [5, p. 437-438].

R.S. published his last sonnet in the *Atlantic Monthly* in 1939, and although he still employs the metaphors of nature, it represents significant improvement over his robin and sparrow work of 40 years previously:

> How sweet the summer! And the autumn shown
> Late warmth within our hearts as in the sky,
> Ripening rich harvest that our love had sown.
> How good that ere the winter comes, I die!
> Then, ageless, in your heart I'll come to rest
> Serene and proud as when you loved me best
> [5, p. 441].

In his closing lines he noted:

> It is apparent, therefore, that in his last months R.S. achieved a certain degree of philosophical tranquility and resignation. It would be a mistake, however, to suppose that, apart from his purely personal reactions to his own fate and his immediate environment, he was less confused at the time of his death than I have described him in my introductory chapter.

> When he gazed beyond the circle of his own work, his family and friends, into the rushing world about him, he was completely bewildered. . . . he could never tell, before he died, whether the fault was in him or in the trends he disliked. He didn't admit this, of course, and remained argumentatively arrogant. But I knew that at the time of his death he was as thoroughly bewildered as any thoughtful individual of our time is bound to be [5, p. 441-442].

It is just this bewilderment that fundamentally links the two cultures that so engaged Hans Zinsser.

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